

SECTION 5: CARDIOVASCULAR CARE

Concern	Care/Test	Frequency
Cardiovascular Care	<ul style="list-style-type: none"> ◆ Check lipid profile Adult goals: Total Cholesterol < 200 mg/dL Triglycerides < 150 mg/dL HDL ≥ 40 mg/dL (men) HDL ≥ 50 mg/dL (women) Non-HDL (Cholesterol) < 130 mg/dL LDL < 100 mg/dL (optimal goal) LDL < 70 mg/dL (for very high risk) ◆ Blood pressure..... Adult goal: < 130/80 mmHg Pediatric goal: below 90% of ideal for age ◆ Assess smoking status ◆ Start aspirin prophylaxis (unless contraindicated) 	<p><i>Children:</i> If > 2 years, after diagnosis and once glycemic control is established. Repeat annually if abnormal. Follow National Cholesterol Education Program (NCEP III) guidelines.</p> <p><i>Adults:</i> Annually. If abnormal, follow NCEP III guidelines.</p> <p>Each focused visit</p> <p>Each visit; if smoker, counsel to stop; refer to cessation</p> <p>Age > 40 with diabetes; Age ≤ 40, individualize based on risk</p>

Diabetes is a major risk factor for cardiovascular disease (CVD) and its related morbidity and mortality. Approximately 75% of deaths in people with diabetes are due to coronary heart disease or other macrovascular disorders. Even in the absence of overt symptoms, people with diabetes have abnormal vascular wall structure and function, especially in coronary blood vessels. It is essential that health care providers and other members of the diabetes health care team pursue an aggressive approach to the assessment and treatment of CVD in order to prevent or decrease the development of cardiovascular complications.

People with diabetes typically exhibit a combination of cardiovascular risk factors including dyslipidemia, hypertension, abnormal platelet function, and elevated serum markers for vascular inflammation. The presence of microalbuminuria is also recognized as an additional risk factor for subsequent cardiovascular events in people with diabetes. All of these risk factors are further aggravated in those who smoke or use other tobacco products.

Lifestyle Modification

Modest weight loss and maintenance, when combined with moderate physical activity (30 minutes or more per day), may assist in controlling high blood cholesterol and triglycerides, high blood pressure, and high blood sugar levels, thereby reducing cardiovascular risk. Research demonstrates that structured programs involving health professionals are the most effective for supporting and maintaining lifestyle modifications. People who used self-monitoring (e.g., daily or weekly weigh-ins, food or physical activity records) were most likely to maintain weight loss.

The National Cholesterol Education Program ATP III recommends Therapeutic Lifestyle Change (TLC) to treat elevated LDL-cholesterol levels. TLC limits saturated fat intake to 7% of calories consumed, and dietary cholesterol to less than 200 mg/day. If LDL-cholesterol goals are not met after implementing these dietary changes, enhancement of TLC with increased viscous (soluble) fiber (10-25 g/day) and plant stanols/sterols (2 g/day) is recommended.

The effectiveness of enhanced TLC has been demonstrated in research using an approach called the Portfolio Diet (low saturated fat, plant stanols/sterols, soy protein, viscous fibers, and nuts). This diet produced an average 29% LDL-cholesterol reduction in one month.

Dietary management of elevated triglyceride and/or reduced HDL-cholesterol levels emphasizes TLC, weight management, regular physical activity, and moderation of total carbohydrate intake (< 60% of calories) by substituting monounsaturated fats.

The Dietary Approaches to Stop Hypertension (DASH) eating plan significantly decreased blood pressures, compared to control groups. The DASH eating plan is low in sodium (less than 2400 mg/day) and high in fruit, vegetables, low-fat dairy foods, whole grains, fish, poultry, and nuts. It is rich in magnesium, potassium, calcium, and fiber and low in saturated fat, cholesterol, and total fat.

A referral to a registered dietitian can assist people in obtaining a healthy weight and making other dietary modifications for reducing cardiovascular risk.

Tobacco Cessation

Tobacco use remains the leading cause of preventable death in the United States and is a major cause of lung, coronary, and peripheral arterial disease. Health care providers play an important role in helping people with their tobacco cessation efforts and advising limited exposure to secondhand smoke. It is important to assess tobacco use status and readiness to quit, as well as to provide clear and personalized advice at each clinic visit. Sharing the benefits of effective interventions, such as behavior modification education, along with the pros and cons of pharmacological agents that attenuate nicotine withdrawal symptoms, may be helpful. A variety of effective pharmacological agents are now available and should be used routinely to facilitate tobacco cessation. It is essential for all providers of care to encourage, support, and continually reassess a person's willingness to quit, especially if he/she was not initially successful. Most studies report about a 30% success rate for initial smoking cessation attempts.

There are many tobacco cessation resources available for both providers and consumers:

- Wisconsin Tobacco Prevention and Control Program (includes links to other information and resources). Web site located at: <http://dhfs.wisconsin.gov/health/TobaccoControl/index.htm>.
- University of Wisconsin Center for Tobacco Research and Intervention (UW-CTRI), Quit Line. Web site located at: <http://www.ctri.wisc.edu/>. Quit Line phone numbers: 1-877-270-STOP (English), 1-877-2NO-FUME (Spanish).
- Treating Tobacco Use and Dependence: The U.S. Public Health Service Clinical Practice Guideline. Web site located at: http://www.ctri.wisc.edu/main_dept/guide/guide_main.html.
- University of Wisconsin Center for Tobacco Research and Intervention (UW-CTRI), Smoking Cessation Services. Web site located at: http://www.ctri.wisc.edu/main_dept/cess/cess_main.html.
- United States Department of Health and Human Services Tobacco Cessation Guideline. Includes information for consumers and clinicians. Web site located at: <http://www.surgeongeneral.gov/tobacco/>.
- Centers for Disease Control and Prevention, Tobacco Information and Prevention Source (TIPS), "How to Quit Smoking." Web site located at: <http://www.cdc.gov/tobacco/how2quit.htm>.

Lipid Monitoring

Diabetes is usually accompanied by a secondary dyslipidemia characterized by a moderately elevated LDL-cholesterol, elevated to high triglycerides, and a reduced HDL-cholesterol. Furthermore, the LDL lipoprotein particles tend to be smaller and more atherogenic. Many people with diabetes exhibit a high fasting triglyceride level (> 250 mg/dL), which in turn limits the indirect calculation of LDL-cholesterol. For these individuals, the non-HDL-cholesterol (total cholesterol minus HDL-cholesterol) is a useful alternative value to monitor. Non-HDL-cholesterol levels can also be used for the initial evaluation of serum lipids for people seen in a non-fasting state or who are less likely to complete follow-up recommendations to return in a non-fasting state.

Recommended management of dyslipidemia must include a combination of medical nutrition therapy, physical activity, and weight loss (for people who have a body mass index (BMI) ≥ 25 kg/m²). Improved glycemic control with lifestyle changes and pharmacologic agents will often lower triglycerides and increase HDL-cholesterol and yet, in many cases, additional treatment with lipid lowering drugs will be required to achieve satisfactory lipid levels (see Table 9).

The National Cholesterol Education Program (NCEP) Guidelines are continually evolving in response to results of clinical studies. A recent expert review panel has concluded that further lowering of LDL-cholesterol to < 70 mg/dL may be warranted for very high risk individuals. Among these risk factors are the presence of established CVD plus (1) multiple major risk factors (especially diabetes), (2) severe and poorly controlled risk factors (especially continued cigarette smoking), (3) multiple risk factors of the metabolic syndrome (especially high triglycerides ≥ 200 mg/dL plus non-HDL-cholesterol ≥ 130 mg/dL with low HDL-cholesterol [< 40 mg/dL]), and (4) people with acute coronary syndromes. To avoid any misunderstanding about cholesterol management in general, it must be emphasized that the optional goal of < 70 mg/dL does not apply to individuals who are not high risk.

The statin class of drugs (HMG-CoA reductase inhibitors) has proven to be the most effective for lowering LDL-cholesterol. A number of clinical trials have reported significant reductions in cardiovascular events in people with diabetes treated with statins. The statins also provide a number of favorable effects that are independent of lipid lowering. These effects include reduction of vascular inflammatory markers (i.e., C-reactive protein) and restoration of endothelial function.

Many people with diabetes will require combinations of lipid lowering agents (such as fibrates, nicotinic acid, ezetimibe, resins, and fish oils) to control more complex and refractory dyslipidemias. Caution should be used when prescribing gemfibrozil or higher dose niacin (> 2 grams/day) in combination with statins. The potential for myopathy increases when using either or both of these drugs in combination with statins. However, fenofibrate appears to be free of this complication. Consultation with a specialist in lipid management may also be required for these individuals. The American Heart Association recommends people with elevated triglycerides (> 150 mg/dL) supplement their diet with 2000-4000 mg (2-4 grams) of omega-3 fatty acids (fish oil) per day. It is also recommended that people with documented heart disease or diabetes take 1000 mg omega-3 fatty acids (fish oil) daily through a supplement.

Table 9: Lipid Therapy Goals for Adults with Diabetes

Test	Results
Total Cholesterol	<ul style="list-style-type: none"> • < 200 mg/dL
LDL-Cholesterol	<ul style="list-style-type: none"> • < 100 mg/dL (optimal goal) • < 70 mg/dL (for very high risk people, e.g., CVD and additional risk factors)
HDL-Cholesterol	<ul style="list-style-type: none"> • Men \geq 40 mg/dL • Women \geq 50 mg/dL
Triglycerides	<ul style="list-style-type: none"> • < 150 mg/dL
Non-HDL Cholesterol	<ul style="list-style-type: none"> • < 130 mg/dL ❖

Source: NCEP-ATP III Guidelines

❖ total cholesterol minus HDL cholesterol

Blood Pressure

Lifestyle modifications are effective in lowering blood pressure and may allow some people to achieve normotension without needing antihypertensive drug therapy. Blood pressure should be monitored at every visit. Home blood pressure measurements using reliable recording units are useful for evaluation of those people who exhibit “white coat” hypertension during clinic visits, and also for titration of antihypertensive drug dosage. It is now recommended that people with diabetes receive aggressive evaluation and management of blood pressure to achieve levels of 130/80 mmHg or lower.

Antihypertensive drug therapy is generally required for people with a baseline blood pressure > 145/95 mmHg. According to recent studies, most people will require two or more antihypertensive drugs to attain satisfactory blood pressure control.

Angiotensin suppression using either Angiotensin-converting Enzyme inhibitors (ACE inhibitors) or angiotensin receptor blockade (ARB) is strongly recommended for initial treatment. These agents are especially effective in lowering blood pressure and reducing both cardiovascular events and diabetic nephropathy. Even in people with mild to moderate reduction in renal function, ACE inhibitors or ARB treatment should be considered because the potential benefits for cardiovascular protection outweigh the possibility of additional impairment of renal function. For those people with mild impairments of renal function, ACE inhibitors or ARB therapy should be started at lower dosages and carefully titrated according to blood pressure response and serum creatinine and potassium levels.

Other classes of antihypertensive drugs are also effective and should be added as required. Recent studies suggest, however, that thiazide diuretics, particularly at higher doses, may worsen glycemic control. Close monitoring is necessary.

Beta-Blocking Agents

In the past, many providers were reluctant to use beta-blocking agents in people with diabetes due to the potential masking of hypoglycemic symptoms and the possibility of worsening glycemic control. However, it is now well established that, following myocardial infarction, beta-blocking agents are highly effective in reducing recurrent ischemic cardiac events in people with diabetes. These studies have reported only rare instances of hypoglycemic masking and

therefore the use of selective β -1 agents is strongly recommended for people who have sustained a prior myocardial infarction.

For people with diabetes and heart failure, Carvedilol is the preferred agent due to its favorable effect on insulin sensitivity and plasma lipid profile. Beta-blocking agents can also be useful for antihypertensive therapy in selected people with increased adrenergic activity (i.e., an elevated resting heart rate).

Antiplatelet Therapy

Platelet inhibition is beneficial for the prevention of both primary and secondary ischemic cardiovascular events in people with diabetes. Aspirin therapy (75 to 325 mg/day) is recommended for people > 40 years with diabetes. For people \leq 40 years with diabetes, use should be individualized based on risk. Common contraindications, such as aspirin allergy or gastric bleeding, must be considered. Previous concern that aspirin therapy may aggravate retinal hemorrhage has not been substantiated.

The relative benefit of aspirin therapy in people with diabetes may be partially attenuated by aspirin resistance and the increased level of inflammation present in vascular structures. Other platelet inhibitors such as clopidogrel should be considered in higher risk people with known CVD, and for those who have undergone coronary stent placement.

Baseline Electrocardiogram and Diagnostic Stress Testing

A baseline reference electrocardiogram (ECG) is recommended for all people with new onset diabetes. Annual or biannual, follow-up ECG monitoring is recommended for those at higher risk, (i.e., those with diabetes plus added coronary artery disease (CAD) risk factors). The incidence of asymptomatic ischemia or infarction increases significantly in people with longer standing or poorly controlled diabetes, especially in people with diabetic autonomic neuropathy, which may mask symptoms of angina.

Routine diagnostic stress testing is not necessary for people with lower risk who have well-controlled risk factors. However, stress testing should be considered for low-risk people prior to starting a physical activity program involving moderate to high intensity activities (e.g., tennis, jogging, aerobics).

All people at higher risk should receive diagnostic stress testing (see “Criteria for Cardiac Stress Testing in Diabetes” below). Baseline ST-segment and T-wave abnormalities are present in 15-20% of people with diabetes > 40 years. Such baseline ECG abnormalities reduce the reliability of ECG monitoring for detecting stress-induced ischemic changes. Stress testing protocols for these individuals should include radionuclear or echocardiographic imaging to maximize the detection of true ischemic responses.

It is important to note that people with diabetes who have an apparently normal radionuclear stress test remain at increased risk for subsequent cardiac events. A recent study reported that, despite normal stress perfusion scans, people with diabetes showed an unexpectedly higher rate (~6%) of fatal CVD events over a three-year interval. Therefore, periodic re-evaluation should be considered, especially in those people at higher risk.

Criteria for Cardiac Stress Testing in Diabetes

- Prior to scheduled major surgery.
- Prior to starting a physical activity program involving moderate to high intensity activities.
- Typical or atypical cardiac symptoms.
- Resting ECG suggestive of ischemia or infarction.
- Presence of peripheral or carotid arterial disease.
- Two or more of the following CVD risk factors:
 - Active smoking status
 - Persistent hypertension (with treatment, blood pressure \geq 130/80 mmHg)
 - Dyslipidemia (LDL-cholesterol > 130 mg/dL or HDL-cholesterol < 35 mg/dL)
 - Microalbuminuria

Heart Failure

Heart failure is a frequent complication in people with diabetes and its prognosis is significantly worse than that of CVD. Treatment of heart failure using current combinations of diuretics, digoxin, ACE inhibitors and/or ARBs, plus beta-blocking agents is as equally effective in people with diabetes as in those unaffected by diabetes. However, several agents commonly used for glycemic control may aggravate heart failure:

- Metformin is contraindicated in people with symptomatic heart failure (class III and IV), due to the increased potential for lactic acidosis secondary to impaired cardiac output and reduced renal function.
- Thiazolidinediones (TZDs) are a valuable new class of pharmacologic agents that are highly effective for maintaining glycemic control. In addition, TZDs have beneficial effects on dyslipidemia, vascular inflammation, and associated endothelial dysfunction. However, TZD treatment is frequently complicated by fluid retention, lower extremity edema, and potential aggravation of heart failure.

Recently published guidelines now recommend careful evaluation of people with diabetes for heart failure signs and symptoms prior to initiating TZD treatment. For people with asymptomatic left ventricular dysfunction or mild, controlled heart failure, the initial dosage of TZDs should be reduced (by half) and then gradually titrated to higher levels according to individual response. Concomitant treatment with other fluid retaining drugs (e.g., non-steroidal anti-inflammatories, vasodilators, calcium channel blockers) should be avoided. People with advanced heart failure (class III or IV) should not be treated with TZDs.

Nutrition: Antioxidant Supplements

Because oxidative stress is believed to play an important role in the initiation and progression of atherosclerotic vascular disease, adequate intake of natural antioxidants found in a variety of fruits, vegetables, whole grains, and omega-3 rich foods is strongly recommended.

Until recently, supplementary antioxidants, such as vitamins A, C, and E, have been recommended to reduce the impact of endogenous oxidative stress. However, clinical trials of vitamin E supplements in people with diabetes failed to demonstrate a significant benefit for the reduction of CVD. Based on these results, routine vitamin E supplementation is not recommended.

Referral to Cardiologist and Coordination of Care

People with diabetes and known CVD may be co-managed with a consulting cardiologist to achieve optimal secondary prevention outcomes.

Essential Patient Education for Cardiovascular Disease

People with diabetes must be informed and reminded of their increased risk of CVD. Explaining strategies for reducing cardiovascular risk is essential. Educational strategies should take into consideration special cultural and educational needs and literacy level or skill, while respecting the individual's willingness to change behavior. Education should include, but is not limited to, the following:

- Discuss the benefits of positive lifestyle changes, such as dietary modifications, regular physical activity, and tobacco cessation.
- To provide the support necessary for making lifestyle changes, create a setting conducive to asking questions, learning self-management, setting realistic goals, and building self-confidence.
- Offer referrals for individual instruction, group education, and support groups, as these can provide a unique, cost-effective opportunity for peer support of lifestyle changes.
- Encourage the use of self-monitoring tools (e.g., activity, food, and blood glucose logs) to help with people track changes; encourage person to share logs with providers.
- Discuss the benefits of improving glycemic control, obtaining recommended tests/exams (especially annual fasting lipid panel), and the importance of a follow-up with cardiologist and primary provider.
- Provide information about tests/exams, their significance, ways of improving test results to reduce cardiovascular risk, and medical checks (blood pressure readings).
- Explain signs and symptoms of potential cardiovascular problems (e.g., myocardial infarction, cardiovascular accident, and peripheral vascular disease); patients and family must know what actions to take when/if these events occur, as well as the importance of early intervention.
- Discuss cardiac medications, the importance of taking them consistently, the best schedule for medicating, possible contraindications, and side effects (e.g., decreased ability to feel low blood sugar when using a beta-blocker).
- Discuss the benefits of seeing a specialist, especially a cardiologist. Registered dietitians, certified diabetic educators, exercise physiologists, pharmacists, social workers, and psychologists are also important team members and can provide initial or ongoing support, information, and education.
- Note that medical advancements are constantly updating previous practices and knowledge and that new or developing information will need to be clearly and thoroughly conveyed.
- Since cardiovascular disease may require more frequent visits with specialized tests, people sometimes become overwhelmed or confused about when to return. Clearly discuss and write down recommended follow-up schedule.

Helpful Tools Included in this Section

- Diabetes Medications Update – 2004 (see Section 4: Glycemic Control)
- Preventing Cardiovascular Events in Persons at Risk or with Established CV Disease

Cardiovascular Care – Question and Answer

Q: Why is the LDL-cholesterol goal so low (70 mg/dL)? How can we help people achieve this level?

A: Recent studies (Heart Protection Study and Prove It) have demonstrated the beneficial effects of LDL-cholesterol reduction on morbidity and mortality from coronary artery disease. LDL-cholesterol reduction is particularly helpful for people with diabetes. Coronary artery disease is the leading cause of death in people with Type 2 diabetes and is second only to end-stage renal disease (ESRD) as the cause of death in people with Type 1 diabetes. With advances in renal transplantation, coronary artery disease may surpass ESRD as the leading cause of death in people with Type 1 diabetes. Due to the high risk for coronary heart disease resulting from Type 2 diabetes, the National Cholesterol Education Program (NCEP) indicates that aggressive lowering of LDL-cholesterol levels, similar to that recommended for established coronary heart disease, can be applied to people with diabetes. The NCEP does not specifically address the issues of LDL-cholesterol reduction in people with Type 1 diabetes. However, given the high incidence of coronary artery disease in people with Type 1 diabetes, it is recommended to achieve comparable (ideal) levels for people with Type 1 diabetes as for those with Type 2 diabetes.

Strategies to reduce LDL-cholesterol include dietary modification, physical activity, weight loss, and lipid lowering medications. Generic niacin is relatively contraindicated for people with Type 2 diabetes because it may worsen hyperglycemia. Newer, long-acting niacin preparations (Niaspan) may have less impact on glycemic control. People treated with niacin agents should be monitored frequently to determine the effectiveness of lipid therapy versus glycemic control. Bile acid sequestrants can worsen hypertriglyceridemia. Many people will require initiation of drug therapy, usually with statins (HMG-CoA reductase inhibitors) to achieve recommended levels of LDL-cholesterol. A team approach, utilizing a diabetes educator, dietitian, and others is beneficial to provide follow-up necessary to help people achieve and maintain the lifestyle changes needed for them to control their disease.

Q: How should elevated triglyceride levels be managed in people with diabetes?

A: Elevated triglyceride levels (TG) and reduced HDL-cholesterol levels are a common form of dyslipidemia in people with diabetes. This pattern occurs due to excess production and slow removal of TG-rich, very low density lipoproteins, especially following high carbohydrate meals. These TG-rich particles also interact with HDL particles, making HDL less effective at clearing LDL-cholesterol. Achievement of optimum glycemic control along with diet and physical activity will sometimes decrease TG by 50-100 mg/dL. Treatment with the statin class of drugs will often produce a simultaneous lowering of LDL-cholesterol and TG, and increase HDL-cholesterol. If TG levels remain elevated (200-400 mg/dL), niacin and fibrates may be added. Generic niacin and bile sequestrants will raise TG levels and should be avoided.

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PREVENTING CARDIOVASCULAR EVENTS IN PERSONS AT RISK or WITH ESTABLISHED CV DISEASE¹⁻¹⁴
Wisconsin Collaborative for Cardiovascular Risk Reduction Initiative 2004

*** Adapted from the AHA/ACC Scientific Statements & Guidelines listed in the references.

CVD RISK FACTORS	CRITERIA FOR RISK	Lifestyle Modifications	Clinical Management Interventions	GOALS
Dyslipidemia 1, 2, 3, 5, 6, 7, 9, 10	<u>Screening for Lipid Risk Factors</u> <u>High Total Cholesterol</u> <ul style="list-style-type: none"> Borderline High: ≥ 200-239 mg/dL High: ≥ 240 mg/dL <u>High LDL¹</u> : Primary target for lipid-lowering therapy. <ul style="list-style-type: none"> Very High: ≥ 190 mg/dL and above. High: ≥ 160-189 mg/dL Borderline High: ≥ 130-159 mg/dL Above Optimal: ≥ 100-129 mg/dL <u>High Triglycerides (TG)^{1, 2, 3, 6}</u> <ul style="list-style-type: none"> Very High: ≥ 500 mg/dL High: 200-499 mg/dL Borderline high: 150-199 mg/dL <u>Low HDL</u> <ul style="list-style-type: none"> < 40 mg/dL for men < 50 mg/dL for women⁶ 	<u>Recommendations</u> <ul style="list-style-type: none"> Encourage weight loss/management. Limit diet to <7% saturated fats and < 200 mg/dL of cholesterol from total calories. Increase consumption of monounsaturated fatty acids (olive/peanut/canola oils, nuts/peanut butter, avocado, olives). Suggest plant stanols/sterols (2/day) to lower cholesterol. Include 6 oz. of fish/wk, specifying tuna, herring or salmon. Medical nutrition therapy and/or other education as indicated. Promote and/or increase daily physical activity. 	<u>Initial Assessment:</u> <ul style="list-style-type: none"> Assess fasting lipid panel (FLP) for baseline. LDL is primary focus. If LDL-C cannot be calculated due to elevated triglyceride level, order LDL-C direct measurement⁷. FLP within 24 hours of hospitalization for an acute event and re-check FLP in 12 weeks. Periodically re-check FLP thereafter until goal values are met. <u>High LDL Therapy Options:</u> <ul style="list-style-type: none"> Evaluate for 10 year CVD risk³. Start with lipid lowering agent – statin preferred. (If patients are hospitalized, start statin). If LDL is ≥ 130 mg/dL (baseline or on treatment) start or intensify lipid lowering therapy to reach goal (statin preferred). If LDL 100- 129 mg/dL (baseline or on treatment): <ul style="list-style-type: none"> Start lipid lowering therapy (statin preferred). Consider combined drug therapy (statin + fibrate or niacin if low HDL or high TG). If LDL is < 100 mg/dL (baseline or on treatment): lipid lowering therapy <u>not</u> required. <u>High Triglycerides Treatment Options:</u> <ul style="list-style-type: none"> If TG ≥ 500 mg/dL: <ul style="list-style-type: none"> Treat TG <u>first</u> to prevent pancreatitis. Initiate/resume lipid-lowering therapy (statin preferred). If TG 200-499mg/dL: <ul style="list-style-type: none"> Start fibrate or niacin. <u>Low HDL Therapy Options:</u> <ul style="list-style-type: none"> If HDL < 40 mg/dL for men or < 50 mg/dL for women: <ul style="list-style-type: none"> First attain LDL goal. Then, intensify weight management and physical activity. 	Total Cholesterol Desired < 200 mg/dL LDL Desired < 100mg/dL Triglycerides Desired < 150 mg/dL HDL Desired ≥ 40 mg/dL for men ≥ 50 mg/dL optimal for women ⁶ ≥ 60 is a negative risk factor
*High Blood Pressure 4, 6, 10, 13 <i>*Accurate blood pressure measurement is essential</i>	<u>Screening for Hypertension</u> <ul style="list-style-type: none"> Prehypertension: ≥ 120-139/ or ≥ 80-89 mmHg Hypertension Stage I: ≥ 140-159/ or ≥ 90-99 mmHg Hypertension Stage II: ≥ 160/ or ≥ 100 mmHg 	<u>Recommendations</u> <ul style="list-style-type: none"> Encourage weight loss/maintenance. Low sodium diet- 1500 to 2400 mg/day¹³. DASH Diet¹³ - low sodium, high fruits & vegetables, high calcium, low alcohol. Medical nutrition therapy and/or other education as indicated. Promote and/or increase daily physical activity. 	<u>Initial Therapy Options for Stage 1 Hypertension:</u> <ul style="list-style-type: none"> THIAZ, BB, ACEI, ARB, CCB, or combination. <u>Therapy Options for Stage 2 Hypertension:</u> <ul style="list-style-type: none"> 2 or more drug combination for most –THIAZ and ACEI, or ARB, or BB, or CCB. <u>Therapy for Comorbid Conditions:</u> <ul style="list-style-type: none"> Heart failure - THIAZ, ACEI, ARB, BB, ALDO ANT. Post MI - BB, ACEI. High CVD risk - THIAZ, BB, ACEI, CCB. Diabetes - ACEI, ARB, THIAZ, BB, CCB. Chronic renal disease - ACEI, ARB. Recurrent stroke prevention - THIAZ, ACEI. <p>Key: THIAZ = thiazide diuretic, ACEI = angiotensin converting enzyme inhibitor, ARB = angiotensin receptor blocker, BB = beta-blocker, CCB = calcium channel blocker, ALDO ANT = aldosterone antagonist.</p>	Blood Pressure Control: Desired <120 /and < 80 mmHg <u>HTN Treatment Goal:</u> Achieve at least <140/<90 mmHg <u>Comorbidities:</u> HTN + diabetes and/or kidney disease goal - <130/<80 mmHg

Note: This practitioner's tool was developed to provide guidance to providers and is not intended to replace or preclude clinical judgment.

Wisconsin Department of Health & Family Services, Division of Public Health, Bureau of Community Health and Prevention - PPH 43073.

Download tool from the Cardiovascular Health Program's website: <http://dhfs.wisconsin.gov/Health/cardiovascular/index.htm>

RISK FACTORS	CRITERIA FOR RISK	Lifestyle Modifications	Clinical Management Interventions	GOALS
Metabolic Syndrome 1, 2, 3, 4, 5, 6, 8, 10, 14	Any Three (3) of the Following: <ul style="list-style-type: none"> Central Obesity - waist circumference > 40 inches for men > 35 inches for women. Triglycerides \geq 150 mg/dL FPG \geq 100 mg/dL - < 126 mg/dL Elevated BP \geq 130/\geq 85 mm Hg HDL < 40 mg/dL for men. HDL < 50 mg/dL for women. 	Recommendations <ul style="list-style-type: none"> Encourage weight loss/maintenance. Medical nutrition therapy and/or other education as indicated. Promote and/or increase daily physical activity. 	Therapy Options: <ul style="list-style-type: none"> Clinical management of dyslipidemia to Dyslipidemia Goals. Lowering blood pressure to BP control goal. Reduction of insulin resistance through achievement of Obesity and Physical Activity Goals. Start and continue with Aspirin (ASA) 75-325mg unless contraindicated. <p><i>The evidence that ASA and other antiplatelet therapy can reduce risk is compelling and suggests a role for platelet hyperaggregability.</i></p>	Improved Metabolic Risk Factors
Diabetes 1, 2, 3, 4, 6, 10, 11, 12	Diabetes is regarded as a CHD risk equivalent with or without the presence of clinical atherosclerotic disease ^{3, 4} .	Recommendations <ul style="list-style-type: none"> Encourage weight loss/maintenance. Medical nutrition therapy and diabetes education. Promote and/or increase daily physical activity. 	Therapy Options: <ul style="list-style-type: none"> Single therapy options: Insulin secretagogues, biguanides, thiazolidinediones (TZD's), alpha glucosidase inhibitors, Insulin, as dictated by A1C. Combination Therapy: as dictated by A1C. Add oral agent(s) and/or insulin. Substitute or intensify insulin regime as needed. Additional Considerations for Treatment/Monitoring: <ul style="list-style-type: none"> Lowering blood pressure⁴. Managing dyslipidemia³. ASA or other antiplatelet agent. Monitor kidney function with albumin/creatinine ratio¹¹. 	A1C < 7.0% Blood Pressure: < 130/ < 80 mm Hg Lipids in Desired Range
Obesity 1, 2, 4, 6, 9, 10	<ul style="list-style-type: none"> Overweight: BMI \geq 25 - 29.9 kg/m² Stage I Obesity: BMI \geq 30 - 34.9 kg/m² Stage II Obesity BMI \geq 35-39.9 kg/m² Stage III Obesity: BMI \geq 40 kg/m² 	Recommendations <ul style="list-style-type: none"> Encourage weight loss/maintenance. Medical nutrition therapy and/or other education as indicated. Promote and/or increase daily physical activity. 	Therapy Options: <ul style="list-style-type: none"> Measure height and weight. Calculate BMI: BMI = kg/m² or wt. in pounds x 704.5 \div ht. in inches². Assess for impaired fasting glucose: fasting plasma glucose (FPG) \geq 100 - < 126 mg/dL. Assess for comorbidities and treat. Assess for other associated diseases: gynecological abnormalities, osteoarthritis, gallstones. 	Weight loss: 5-7% of body weight or BMI of < 25 kg/m²
Physical Inactivity 1, 2, 3, 6, 4, 10	<ul style="list-style-type: none"> Inactivity is defined as: < 30 minutes of moderate physical activity 5 times or more per week. 	Recommendations <ul style="list-style-type: none"> Promote and/or increase daily physical activity. 	Therapy Options: <ul style="list-style-type: none"> Evaluate for sedentary lifestyle and occupational level of activity. Promote physical activity. Prescribe appropriate activities and/or refer moderate to high-risk patients to medically supervised activity programs. Re-assess at every visit. 	At least 30 minutes of moderate physical activity daily.
Tobacco Use 1, 2, 6	<ul style="list-style-type: none"> Cigarette smoking. Pipe smoking. Chewing tobacco. Environmental exposure. 	Recommendations <ul style="list-style-type: none"> Tobacco cessation. Reduce environmental exposure. 	Therapy Options: <ul style="list-style-type: none"> Assess history of tobacco use or environmental exposure. Provide information on smoking cessation programs. Encourage non-prescription and/or prescription cessation products. Refer for support/counseling, e.g., stress reduction, nutrition education. Re-assess every visit. <p>Wisconsin Quit Line: 1-877-270-STOP (7867) (español: 1-877-2NO-FUME)</p>	Tobacco Cessation
Family History 3, 4, 6	<ul style="list-style-type: none"> First degree relative with early-onset atherosclerotic CVD, < 55 years in men and < 65 years in women. 	Recommendations <ul style="list-style-type: none"> Medical nutrition therapy and/or other education as indicated. Promote and/or increase physical activity. 	Therapy Options: <ul style="list-style-type: none"> Obtain family history of CVD and provide family counseling as appropriate. Evaluate for 10 year CVD risk³. Treat modifiable risk factors: hypertension, diabetes, dyslipidemia, metabolic syndrome, established coronary heart disease, sleep apnea. 	Lifestyle Changes Control of Modifiable Risk Factors

***1. AHA/ACC Guidelines for Preventing Heart Attack and Death in Patients With Atherosclerotic Cardiovascular Disease: 2001 Update. 2. AHA Guidelines for Primary Prevention of Cardiovascular Disease and Stroke. 2002 Update. 3. ATP III, NIH Pub. # 02-5215, September 2002. 4. JNC 7, NIH Pub # 03-5233, May 2003, cites diabetes as a CHD risk equivalent with or without the presence of clinical atherosclerotic disease. 5. Triglyceride values exceeding 400mg/dL are generally considered too high to calculate LDL-C, but laboratory thresholds may vary. ATP III, pg. III-6. 6. AHA Evidence-Based Guidelines for Cardiovascular Disease Prevention in Women, February 2004. 7. Non-HDL cholesterol = total cholesterol minus HDL cholesterol. ATP III, pg. II-7. 8. The presence of metabolic syndrome accentuates the risk accompanying elevated LDL cholesterol. Modification of atherogenic dyslipidemia, hypertension and the prothrombotic state will reduce the risk for CHD. ATP III, pg. II-26. 9. NHLBI Practical Guide to Obesity, Oct. 2000. 10. Physical Activity Fundamental to Preventing Disease, HHS, June 2002. 11. Essential Diabetes Mellitus Care Guidelines, WI Diabetes Advisory Group, April 2001. 12. Medical Management of DM: The AACE System of Intensive Diabetes Self-Management, 2002 Update, Endocrine Practice, (Suppl. 1), January-February 2002. 13. Facts About the DASH Eating Plan, NIH Pub # 03-4082, Updated May 2003. 14. AHA/NHLBI/ADA Conference Proceedings: Clinical Management of Metabolic Syndrome, Circulation, January 2004.